Taxes and Equity in Middle Income countries:
Taxes, Social Insurance, and Incentives to Informality.

Orazio P. Attanasio

UCL, IFS, NBER & BREAD
o.attanasio@ucl.ac.uk

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Tax and equity in middle income countries: two case studies and some considerations.

This presentation draws on work from several papers and studies.

- A study of the 2010 Mexico tax reform, financed by the World Bank, with Laura Abramovsky and David Phillips

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  - Informality:
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  - Existing regulations and the necessity of reform.
- It is important to think of the tax and benefit system as a whole.
The components of the social insurance system

Taxes

- Income (labour) taxes;
- Capital taxes;
- Consumption taxes
The components of the social insurance system

**Taxes**
- Income (labour) taxes;
- Capital taxes;
- Consumption taxes

**Benefits**
- Welfare and social programs;
- Unemployment benefits?
- Pension systems;
- Health systems.
Inequality and its measurement

- How do we measure standard of living (and inequality)?
  - Income?
  - Expenditure?
Inequality and its measurement

- How do we measure standard of living (and inequality)?
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- Data issues and measurement error.
Inequality and its measurement

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- Data issues and measurement error.
- Market imperfections, intertemporal dimensions.
Challenges in the analysis

- Quantitative analysis of tax systems and reform proposals important.
Challenges in the analysis

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- Measurement issues:
  - Limited availability of administrative data;
  - Poor quality of survey data;
  - Some phenomena are intrinsically difficult to measure (informality).
Challenges in the analysis

- Little is known about behavioural responses:
  - Labour supply elasticities;
    - Extensive margins;
    - Participation to informal sector.
  - Consumption responses to changes in relative prices.
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- Sources of exogenous variation that can identify such elasticities.

- The study of reforms is important.
Two case studies

We will present the analysis of two reforms
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- Mexico tax reform in 2010
  - Proposed reform.
  - Actual reform.

Chile 2008 pension reform.

The purpose is both substantive and of methodology.
Substantive: we want to discuss the implications of these important reforms.
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The 2010 Mexican tax reform

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  - a substantial extension of the VAT base;
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  - an increase of various excises (beer, tobacco, lotteries etc.)

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Proposed and actual tax reforms

Initially proposed in 2009 (Proposed)
- introduction of 2% expenditure tax (the CCP) on all goods and services
- increase in the IEPS tax rate
  - on alcohol drinks +20%, modelled as increase in rate from 50% to 53%
  - on beer from 25% to 28%
  - on tobacco, modelled as increase in rate from 160% to 164%
  - on lottery games from 20% to 30%
  - on telecommunications services from 0% to 4%
- increase in the top three rates of income tax (ISR)
  - from 28% to 30%, 21.95% to 23.52% and 19.94% to 21.36%. Reduce 16% threshold
  - Only the part of tax paid on employment income is considered

Approved and implemented in 2010 (Approved)
- increase in VAT rate from 15% to 16%, abstracting from differences in border areas
- increase in the IEPS tax rate
  - on alcohol drinks +20%, modelled as increase in rate from 50% to 53%
  - on beer from 25% to 26.5%
  - on tobacco, modelled as increase in rate from 160% to 164%
  - on lottery games from 20% to 30%
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The MEXTAX program

- We built a microsimulation program to evaluate the distributional impact of the reform.
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- It models the details of the actual tax code as well as the proposed changes.
- It outputs detailed table with summary distributional and revenue figures.
- It allows different options on the treatment of missing values.
The MEXTAX limitations

- The program does not model behavioural responses to changes in taxes, wages, prices.
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- We discuss both issues in detail.
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- The results are as good as the data that go into the program.
- We discuss both issues in detail.
- The main 'solution' is to perform robustness analysis.
The MEXTAX assumptions

We make the following set of assumptions throughout the analysis:

- Members of state government SS schemes face national government SS schedule
- Formal workers comply with tax law on all income
- Formal workers paid at least the Mexico City minimum wage
- Income Tax and employees SS contributions incident fully on the worker
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We make the following set of assumption in the baseline simulations:

- Workers are considered to be formal if covered by an SS health scheme through own work
- Expenditure is considered to be formal (and subject to IVAT and duties) unless the type of vendor is a street market or stall
- IVAT and duties are fully incident on the consumer
- No adjustment is made for under-reporting of income or expenditure
Average gain and losses due to proposed reforms across the income distribution

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Income decile group

Income Tax
IVA (uniform CCP)
IEPS

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Average gain and losses due to proposed reforms across the income distribution

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Average gain and losses due to approved reforms across the income distribution
Average gain and losses due to approved reforms across the income distribution

Gain/loss (% of net total income)
Average gain and losses due to proposed reforms across the expenditure distribution

Expenditure decile group

Gain/loss (% of total expenditure)

Poorest 2 3 4 5 6 7 8 9 Richest

Income Tax IVA IEPS

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Average gain and losses due to proposed reforms across the expenditure distribution

<table>
<thead>
<tr>
<th>Expenditure decile group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poorest</td>
<td>-2.00%</td>
</tr>
<tr>
<td>2</td>
<td>-1.50%</td>
</tr>
<tr>
<td>3</td>
<td>-1.00%</td>
</tr>
<tr>
<td>4</td>
<td>-0.50%</td>
</tr>
<tr>
<td>5</td>
<td>0.00%</td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Richest</td>
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Average gain and losses due to approved reforms across the expenditure distribution.
Average gain and losses due to approved reforms across the expenditure distribution

Gain/loss (% of total expenditure)

Expenditure decile group

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Sensitivity analysis.

Measurement error

- One big issue is that of measurement error.
Sensitivity analysis.

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Sensitivity analysis.

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Sensitivity analysis.

**Measurement error**

- One big issue is that of measurement error.
- For instance, we get only a small fraction of capital income.
- The overall impression is that the top of the income distribution is missing from ENIGH.
- We make a variety of assumptions but the result do not change much.
Sensitivity analysis.

Formality and pass-through of VAT
Sensitivity analysis.

Formality and pass-through of VAT

- We also try a variety of different assumptions about the definition of formality.
Sensitivity analysis.

**Formality and pass-through of VAT**

- We also try a variety of different assumptions about the definition of formality.
- ... and about VAT pass-through.
Sensitivity analysis.

Formality and pass-through of VAT

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- The overall picture does not change much
**Behavioural responses.**

**Labour supply.**

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- Ideally one would have a structural model of participation, hours worked and tax evasion.
- We do not have such a model.
Reduced form model of formal labour income elasticities

- We do not differentiate between 'real' and 'shifting' responses (include both).
Reduced form model of formal labour income elasticities

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- Intensive margins: decision to change formal income at margin (Marginal effective tax rate and marginal elasticity).
- Vary elasticities by demographic groups and consider different scenarios.
PTR and METR definitions

\[ \text{METR} = \frac{\text{ISR}_{\text{rate}} + \text{SocSec}_{\text{rate}} + \text{AvIndirectTax}_{\text{rate}}}{1 + \text{AvIndirectTax}_{\text{rate}}} \]

\[ \text{PTR} = \frac{\left( \frac{\text{ISR}_{\text{Amt}} + \text{SocSec}_{\text{Amt}}}{\text{GrossInc}} + \text{AvIndirectTax}_{\text{rate}} \right)}{(1 + \text{AvIndirectTax}_{\text{rate}})} \]
Change in Income

\[ \text{Gross}_{\text{new}} = \text{Gross}_{\text{old}} \times \left( \frac{1 - \text{METR}_{\text{new}}}{1 - \text{METR}_{\text{old}}} \right)^{\text{IntElast}} \times \left( \frac{1 - \text{PTR}_{\text{new}}}{1 - \text{PTR}_{\text{old}}} \right)^{\text{ExtElast}} \]
Behavioural responses

Indirect tax incidence

- Standard assumption is that changes in indirect taxes are fully incident on consumers.
  - It assumes either perfectly elastic supply or perfectly inelastic demand.
Behavourial responses

Indirect tax incidence

- Standard assumption is that changes in indirect taxes are fully incident on consumers.
  - It assumes either perfectly elastic supply or perfectly inelastic demand.
- Use sensitivity analysis to see how distributional and revenue effects of reforms vary when less than full pass-through
  - 50% or 75% pass through
  - Part not borne by consumers is either 0
  - Rest borne by the owners of capital
**Behavioural responses**

**Consumer responses**

- Consumers can respond to changes in income and prices by changing their spending patterns

---

Estimate a theory consistent demand system. Can look at welfare effects as well as changes in spending patterns. Quadratic Almost Ideal Demand System (QUAIDS). Previous estimates using PROGRESA data to evaluate the welfare effects of food price increases (Attanasio, Dimaro, Lechene and Phillips, 2009). Flexible Engel curves. We use state level and time variability in prices to estimate price elasticities. We allow for non-separability between consumption and labour supply status.
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**Consumer responses**

- The results we obtain from estimating the demand system:
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Behavioural responses

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Consumer responses

- The results we obtain from estimating the demand system:
  - Deliver a sensible set of own and cross price elasticities for the commodities we consider.
  - Employment effects are by and large important.
  - This has important implications for the 'optimal' rates on VAT.
### Table 4 Effect of an employed household head on expenditure shares

<table>
<thead>
<tr>
<th>Good</th>
<th>Coefficient on Employment</th>
<th>Current VAT Status</th>
<th>Optimal VAT Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-VAT Food</td>
<td>0.0084**</td>
<td>No VAT</td>
<td>+</td>
</tr>
<tr>
<td>VAT Food and Food Out</td>
<td>0.0124**</td>
<td>VAT</td>
<td>-</td>
</tr>
<tr>
<td>Alcohol and Tobacco</td>
<td>0.0000</td>
<td>VAT</td>
<td>+</td>
</tr>
<tr>
<td>Clothing</td>
<td>0.0111**</td>
<td>VAT</td>
<td>-</td>
</tr>
<tr>
<td>VAT Household, etc.</td>
<td>-0.0311**</td>
<td>VAT</td>
<td>+</td>
</tr>
<tr>
<td>Non-VAT Household, etc.</td>
<td>-0.0041**</td>
<td>No VAT</td>
<td>+</td>
</tr>
<tr>
<td>VAT Transport</td>
<td>-0.0079**</td>
<td>VAT</td>
<td>+</td>
</tr>
<tr>
<td>Non-VAT Transport</td>
<td>0.0211**</td>
<td>No VAT</td>
<td>-</td>
</tr>
<tr>
<td>Non-VAT Health, Education</td>
<td>-0.0068**</td>
<td>No VAT</td>
<td>+</td>
</tr>
<tr>
<td>VAT Health, Education</td>
<td>0.0022*</td>
<td>VAT</td>
<td>-</td>
</tr>
<tr>
<td>Leisure Goods and Services</td>
<td>-0.0051**</td>
<td>Generally VAT</td>
<td>-</td>
</tr>
<tr>
<td>Other Services</td>
<td>0.0022</td>
<td>Generally VAT</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: ** means significant at the 1% level, whilst * means significant at the 5% level
Source: ENIGH 2008, Bank of Mexico Price Indices and authors’ calculations
Other indirect taxation issues

- The analysis ignores other important issues in the design of indirect taxation.
Other indirect taxation issues

- The analysis ignores other important issues in the design of indirect taxation.
- Compliance, pass through, firm choices, vertical links among firms are all important.
- These can have important consequences for the 'transmission of informality' across firms.
- see De Paula and Scheinckman (2010) for a model and evidence on the Brazilian SIMPLES reform of VAT.
Chile’s pension system and its 2008 reform.

- Chile was one of the first countries to introduce a funded pension system based on private savings.
Chile’s pension system and its 2008 reform.

- Chile was one of the first countries to introduce a funded pension system based on private savings.
- The original system contained three tiers.
  - Basic non contributory pension (insurance).
  - Defined contribution pension funded by individual contributions throughout working life.
  - Third private tier.
Chile’s pension system and its 2008 reform.

- In 2008 a reform was introduced with the aim of improving incentives for work in the formal sector, particularly for women, and to address the problem of old age poverty.
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- The aim of our exercise is to evaluate the impact of the 2008 reform to the Chilean pension system.
- The main empirical strategy has been to estimate directly the resulting response to incentives.
- We then use these responses to discuss the way that the pension reform is predicted to change pension coverage, work patterns and poverty.
Chile’s pension system and its 2008 reform.

- The reform changes the interaction between the first and second tier.
Chile’s pension system and its 2008 reform.

- The reform changes the interaction between the first and second tier.
- In the old system, for those who had no pension entitlement and low income a minimum welfare transfer (PASIS).
- For those with more then 240 months contribution but insufficient funds for a pension above a guarantee (PMG) the pension guarantee.
Chile’s pension system and its 2008 reform.

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  - Compulsory contributions by the self-employed
- The main aim was to improve pension levels and incentives to contribute, especially for women.
The Incentive Structure of the Reform

Figure 1

Pre and Post Reform First Tier

Final pension (FP)

PMaS

PMG

PBS

Pasis

Before reform

(PMG if retiree has contributed at least 240 contributions)

(PASIS if retiree complies with the means testing)

After reform

Self-financed pension

54000 75000 96000 255000

Before reform

After reform

(PMG if retiree has contributed at least 240 contributions)

(PASIS if retiree complies with the means testing)
Evaluation strategy.

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- ....and then use theory and regression analysis to establish the effect on informality.
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- The Encuesta de Proteccion Social.
- Linked to administrative data on contribution to the pension system.
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- We then relate the probability of being formal to a set of control variables, pension wealth and accrual rates.
Evaluation strategy.

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Then we estimate the impact of these summary elements of the pension scheme on work and contribution incentives.

Pension wealth is defined as the total amount of expected pension wealth based on current accumulations and future expected accumulation.

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- Pension wealth is affected by the pension rules but also includes an insurance mechanism:
  - If someone is eligible for PMG we impute as pension wealth the amount equivalent to fund that pension.
- The accrual rate is defined as the extra pension to be obtained in the individual works in the current period, everything else being equal.
Evaluation strategy.

- The key equation we will be estimating is

\[ Y_{it} = 1[Y_{it}^* > 0] \]  

\[ Y_{it}^* = X_{it} \gamma + \beta E_t PW_{iR} + \delta E_t AR_{iR} + \tau_t + \alpha_i + \epsilon_{it} \]  

- \( Y_{it} \) is the discrete labor supply taking the value of 1 if individual \( i \) is working in the formal sector at year \( t \) and 0 otherwise.
- \( X_{it} \) is a vector of controls including usual socioeconomic and demographic variables.
- \( E_t PW_{iR} \) is the expected (at time \( t \)) pension wealth at retirement (\( R \)).
- \( E_t AR_{iR} \) is the expected accrual rate at retirement of working the current year \( t \), i.e. the pension benefits accruing due to work in this period.
Constructing pension wealth.

To construct expected pension wealth we need to predict future life-cycle events:
1. Working in the formal sector (contributing)
2. Working in the informal sector
3. Having Children
4. Marrying and divorce
5. Earnings
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We construct reduced form models for each of these events and we predict forward for each individual based on their characteristics.
Identification strategy.

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- We use the reform as an instrument to solve this problem.
- We exploit the differential effect of the reform on different groups.
- In addition to the basic change we also take into account the changes induced on pension wealth by children subsidies and divorce rules.
- We therefore have to predict, for each individual, number of children and probability of divorce.
Predicted fertility

The subsidy for each child is equal to 1.8 times the minimum wage existing at the time of birth of the child.

(a) probability of a child

(b) child subsidy
Predicted fertility

- Estimate marriage and divorce probabilities
- Use data to determine who is likely to be worse off
- We assume a compensation fraction equal to 0.30.
Impacts on pension wealth and accrual rates

(a) Pension wealth: men

(b) Pension wealth: women
Impacts on pension wealth and accrual rates

(a) Accrual rates: men

(b) Accrual rates: women
Formality equation: impact of pension wealth and accrual rates

Coefficients on wealth and accrual rates interacted with age.

<table>
<thead>
<tr>
<th>variable</th>
<th>coeff.</th>
<th>st.err</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension wealth</td>
<td>-0.025</td>
<td>(0.006)</td>
</tr>
<tr>
<td>Pension Wealth × Age</td>
<td>-0.536</td>
<td>(0.0001)</td>
</tr>
<tr>
<td>Accrual Rate</td>
<td>-0.0003</td>
<td>(0.0001)</td>
</tr>
<tr>
<td>Accrual Rate × a</td>
<td>0.03</td>
<td>(0.0012)</td>
</tr>
</tbody>
</table>
Marginal effects

Pension wealth: men and women

Pension Wealth Marginal Effect %
Control Function Probit Model

<25 26-30 31-35 36-40 41-45 46-50 51-55 56-60 61-65

Women Men
Marginal effects

Accrual rates: men and women

Accrual Rate Marginal Effect %
Control Function Probit Model

Men
Women

Orazio P. Attanasio (IFS/UCL)
Distributional impacts

(a) Pension distribution 1940 Cohort
(b) Pension distribution 1960 Cohort
Distributional impacts by education

(a) No education

(b) Primary education
Impact on formality

Probability of contributing

(a) Women cohort 1940

(b) Women cohort 1960
Conclusions on the Chilean reform

- Pension reform redistributed substantially.
Conclusions on the Chilean reform

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- However, the impact of the reform on informality were perverse.
  - This was due to the initial distribution: for some women incentives decreased and for other increased.
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- However, the impact of the reform on informality were perverse.
  - This was due to the initial distribution: for some women incentives decreased and for others increased.
- A more sophisticated approach would take into account estimated behavioural responses in estimating pension wealth.
Challenges and Future Research

- Behavioural responses to tax incentives:
  - Especially on informality.
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  - Especially on informality.
- Some large existing transfer programs have become permanent features in some middle income countries (Oportunidades, Bolsa Familia):
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- The big difficulty is in identifying the relevant elasticities.
Unanswered questions on large transfer programs (CCTs)

- what is their long run impact on human capital?
- can they be improved?
  - quality of services
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- do they create disincentives in some sectors?
Challenges and Future research

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- Things have improved with the large evaluations, but much more needs to be done.
- Information on informality is particularly crucial.
We have showed two case studies that considered two important reforms.

- In the case of Mexico we looked at the distributional impact of a recent fiscal reform. These impacts were modest.
- In the case of Chile we have looked at a recent pension reform. The reform did achieve its redistributional goal. However, the incentives to informality were made worse relative to the initial situation.

Both examples show the importance of good quality data to perform crucial analysis of the reforms impacts.
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